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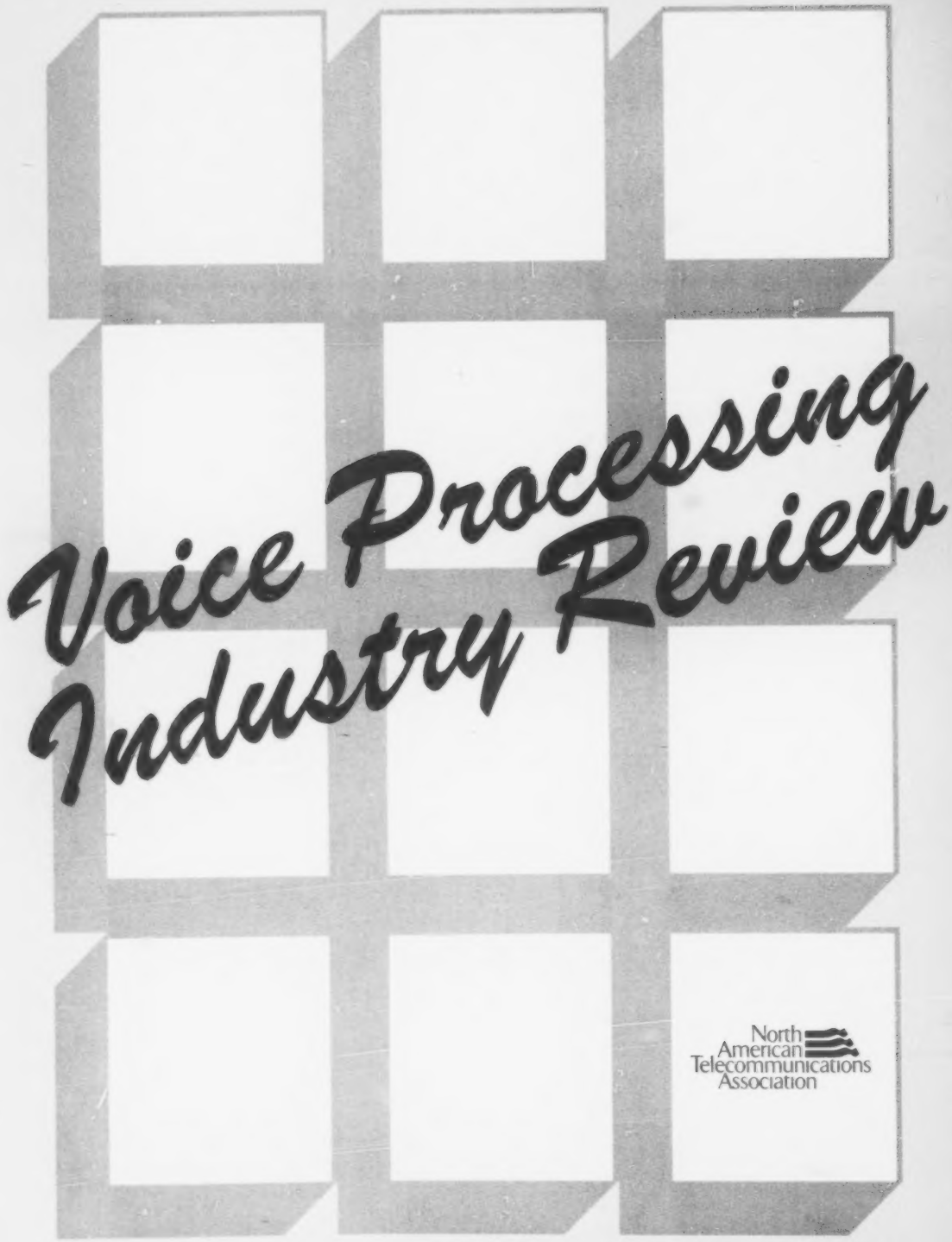

Voice Processing Industry Review

North American Telecommunications Association

VOICE PROCESSING
INDUSTRY REVIEW

North American Telecommunications Association

Research and Analysis
Eric G. Nelson
Director, Market Research

Research Assistance
Thomas B. Goehner

Editorial Review
Arthur Rosenberg

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2000 M Street, N.W., Suite 550
Washington, D.C. 20036

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SCOPE AND METHODOLOGY

The 1989 VOICE PROCESSING INDUSTRY REVIEW was prepared by the Market Research Department of the North American Telecommunications Association. The information Contained in the report was obtained through secondary research methods. The data came principally from U.S. Government sources and by reviewing all relavent trade journals and other public sources and preparing estimates that present the general concensus of industry trends. The information contained in this report represents the best efforts of the NATA Market Research Department at preparing useful and timely information. NATA specifically does not guarantee the accuracy of the data contained in this report. NATA staff is available to answer any questions relating to the statistics presented herein by calling 1-800-538-6282.

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INTRODUCTION

INTRODUCTION

Voice processing represents a new dimension in personal communications. No longer do businesses have to suffer inefficiencies due to bottlenecks in inbound or outbound call traffic. Customers get better, more prompt service. Secretaries, receptionists, operators, and other support personnel can become more efficient when many of their telephone duties become automated and their time can be spent on more productive activities. In short, voice processing provides a win-win situation for both the business and for the customer--businesses become more efficient and productive and customers get better service.

In the context of this report, voice processing products are those that provide at least voice store and forward messaging functions. Some of the systems discussed offer other features as well, such as voice response, automatic call distribution, audiotex, and other advanced functions. These advanced features are not necessarily available in all, or even most of the products addressed. The main focus herein is to address those products that are capable of at least voice messaging, regardless of the other features that may be available. In fact, with systems becoming more and more feature-rich, whether the system is called a voice messaging system or something else, is more dependent on the application than the capabilities of the system. However, all types of systems fall into the broad category of voice processing.

Voice processing, as described above, can be accomplished through various combinations of hardware and software which are frequently installed as stand-alone equipment. These systems can be used by themselves or as adjuncts to PBX/key/centrex systems. In addition, some of these voice processing functions can be integrated in a business telephone system such as a private branch exchange (PBX) or a centrex system. While this study will peripherally address voice messaging capbility that is integrated in a PBX/Centrex system, much of the data and information will be

limited to stand-alone systems, whether used alone or as an adjunct. However, it must be noted that, from the users perspective, there is no apparent difference in the features of integrated systems compared to stand-alone systems.

Equipment that is related to the main products discussed herein but not addressed in much detail include stand-alone voice response systems, automatic call distributors (ACDs), automated attendants, call sequencers, uniform call distributors (UCDs), auto-dialers, telecomputers, consumer-type telephone answering machines, voice recognition devices, speech synthesizers, and integrated voice-data terminals. These products are used to enhance business communications through facilitating inbound and/or outbound call traffic. Many of these products are used in conjunction with other voice processing products in specialized business applications such as telemarketing.

Voice messaging (also called voice mail), the main thrust of this report, is the ability to leave a message in the caller's own voice in the called party's voice "mailbox." This is similar to the use of a telephone answering machine. With both technologies, the verbal message exactly replicates the caller's tone of voice and inflection. Telephone answering machines do offer some of the same capabilities of voice messaging systems, and for very small telephone systems or for consumer application they may be the appropriate technology. However, voice messaging offers much more intelligence and flexibility than telephone answering machines, and for larger systems is usually the appropriate solution.

With voice messaging, the message can be virtually as long and detailed as the caller wants. At a convenient time, from any touch-tone telephone, the called party can access his/her voice "mail box" to retrieve any messages and act on them. The recipient of the message can save the message, forward the message to another party, replay the message, or erase the message. Voice messaging systems, especially of the same

manufacturer, can be networked together so messages can be broadcast to several voice mailboxes (or forwarded) in a multi-location environment.

Voice messaging offers many advantages over conventional telephone message taking and even general written communication between parties:

- Voice mail enhances communication--Because a voice message exactly reproduces the tone and inflection of the caller's voice, it can more accurately represent the exact meaning of the caller's message. Some experts estimate that spoken communication is six times more effective than written communication.

- Voice mail is confidential--Written communication can be read by anyone. Written phone messages are even more susceptible to lack of privacy. They are naturally read by the secretary or receptionist that wrote them. In addition, they are usually placed in a location accessible to others. With a voice messaging system, the message is recorded in private and each voice mailbox has a security code that must be entered prior to retrieving a message.

- A voice mail box is accessible anywhere there is a touch-tone phone--With written communication, the receiving party must physically handle the written letter or phone message. It therefore is not accessible until the party is at the same location as the written material. With voice mail, the voice mailbox can be remotely accessed from any touch-tone phone anywhere and the message can be retrieved and processed.

- Voice mail is faster than conventional mail--A written letter takes anywhere from one day to a week to deliver. A voice mail message is instantaneous and, like a letter, can be attended to whenever it is convenient.

In many instances, voice messaging even has advantages over an actual, real-time telephone conversation.

- Voice mail is a significant time-saving tool for business people--For busy business people, telephone conversations can be unnecessarily time consuming, especially when some sources estimate that only 50 percent of all telephone calls require a two-way conversation. In addition, the age-old game of telephone tag, a very time consuming, frustrating process, can be significantly reduced, if not eliminated. In addition, many long distance calls that would otherwise have to be made during expensive peak hours can be made during non-peak hours. As a result, some sources estimate that a voice mail system can reduce a telephone bill by as much as 30 percent.

- Voice messaging can take place in non-real time--For example, a caller from a different time zone can leave a specific instruction or other message (not requiring real-time communication) when it is convenient, and the recipient can retrieve the message and listen to it at his convenience.

VOICE PROCESSING BACKGROUND

VOICE PROCESSING BACKGROUND

PRODUCT DEVELOPMENT

Telephone answering devices have been available for several decades. These products were stand-alone devices that performed only the simplest tasks of answering and recording telephone messages. A separate device was needed for each telephone instrument.

In the mid 1970s, centralized voice messaging systems were developed that could answer multiple telephones. They still provided only basic telephone answering and the caller was required to go through the PBX attendant in order to leave a message in a particular voice mailbox. These systems were very bulky stand-alone devices used only in very specialized applications. The prices ranged from $300,000 to $500,000.

In 1982, voice messaging systems were introduced that could be integrated with a PBX. These systems offered more advanced features than preceding models, including direct system access for inbound calls, personalized voice mailbox greetings, call transfer capability, remote retrieval and manipulation, and message waiting indicators. These systems typically included computer-like central processing units, disk storage for digitized voice signals, and operating software. These systems were still rather large and bulky with substantial price tags.

These systems have evolved into a current generation of stand-alone systems that offer a wide variety of options, including integrated automated attendant, ability to modularly upgrade, networking (currently only available between systems of the same manufacturer), and integration with other communications systems such as automatic call distributors (ACDs), facsimile, and electronic mail (E MAIL). This capability is currently available for only certain specific systems.

Another development leading to a relatively distinct type of voice messaging systems has been the progression toward PC-based systems. These systems use PCs (personal computers) for the control aspects of the voice messaging system. They were first offered in 1986 to address the needs of smaller users and have been able to provide a relatively low-cost voice messaging option at the low end of the market. These systems typically can support various voice processing functions in addition to voice messaging. PC systems have grown in popularity due to their flexibility, relatively fast and easy programmability, and cost. The major drawbacks are capacity constraints, lack of full PBX/key integration capability, and lack of networking ability.

INTEGRATION WITH OTHER BUSINESS SYSTEMS

Voice messaging is typically used with other communications and office automation systems to provide a complete communications solution to a user company. Virtually all voice messaging systems are integrated into a customer's main telephone system, whether PBX, centrex, or key. In addition, new technological advances in the area of the integration of various other communications and office automation systems make it one of the most explosive growth opportunities in telecommunications. A typical configuration has voice mail used in conjunction with an automated attendant. Many voice mail systems, in fact, have integrated automated attendant capabilities. Voice messaging can be combined with automated attendants in such a way that it can be used in voice response applications.

Voice response and audiotex capabilities are at least one level removed from simple voice messaging. Both voice response and audiotex integrate voice messaging-like features with other equipment such as automated attendants and data base management equipment to provide automated call processing functions. Typically, these integrated voice processing systems are made up of hardware and software customized for an individual customer or type of customer.

Voice response systems can be interactive or noninteractive. An interactive system answers a call, gives the caller options from which to select, and accepts responses entered by the caller using the telephone keypad, and allows the caller to access a data base and make some change to that data base. For example a bank might have an interactive voice response system that would allow a customer to access his/her account, transfer funds, pay a credit card bill, etc.

A noninteractive system simply gives the caller options, accepts the caller's choice of options and provides verbal information. Audiotex is similar to noninteractive voice

response, with the exception that voice response systems typically access data bases external to the voice response system, while audiotex has the information self-contained.

Other business systems increasingly being integrated with voice messaging for inbound and, to some extent, outbound call management capability are electronic mail (E MAIL), facsimile terminals, mainframe computers, personal computers, and LANs (this is a rapidly developing area, and no inter-product standards yet exist for full implementation). This increases the flexibility of voice processing by giving the user the choice of messages that are verbal, in hard-copy form, or on a video screen.

When used with other office systems, the capabilities and flexibility of voice processing can be greatly enhanced. Internal communications can become more flexible and efficient and external communications can save time and money. Moreover, customer services are made more convenient, thereby increasing customer satisfaction.

VOICE MESSAGING APPLICATIONS

Applications for voice messaging systems are limited only by the imagination. Most business environments can benefit from a voice messaging system. A voice messaging system can save a company money and increase customer satisfaction. Productivity is increased by freeing up employees to do more important jobs. Voice messages are always accurate and always reflect exactly what the caller actually said. Like certain other telecommunications products such as facsimile, voice messaging is penetrating virtually every business sector and becoming such a crucial business tool that users wonder how they got along without it. Some of the most obvious applications for voice messaging include:

- Sales-oriented environments where the salesperson spends a significant portion of their time away from the office-

  In this type of environment sales productivity can be significantly enhanced with a voice messaging system by allowing the salesman to spend more time away from the office selling and less time on the telephone returning telephone calls and picking up messages. In addition, it allows the sales rep to leave instructions for the administrative support staff at any time and be assured they will get the message. The sales rep can even leave his customers' orders in a special voice mail box for processing later.

  Moreover, customers will typically get better service because the voice mail system is always available, always friendly, always accurate and can take as long a message as the customer would like to leave.

- Customer service organizations-

  Customer service organizations are communications intensive. By their very nature they require extensive interaction with the customer. A voice messaging system can greatly facilitate communications in this type of environment by tying together the customer, service personnel, the technician, and company management.

  Answers to common customer-oriented questions can be posted in a "listen-only" voice mail box. Customer service dispatch operations can be made more efficient by posting service calls in the technician's mailbox. For applications where customers bring in articles for repair, the customers can be given temporary mailboxes where they can check the status of the repair.

- Professional services organizations-

  Professional service organizations such as law firms, accounting firms, and doctors are prime candidates for voice messaging. Lawyers, accountants, and doctors have time sensitive jobs. Legal contracts, financial deals, and patient conditions can fluctuate rapidly. Lawyers, accountants, and doctors all must be able to hear from their clients or patients frequently.

  Voice messaging is a significant tool for professionals. Wherever they are, when they have the time, they can listen to their voice messages and react accordingly. This might be especially practical if a pager were used

in conjunction with voice messaging. The caller could leave a message in the voice mail box. The voice mail system could then be configured so that it would dial up the pager and alert the lawyer/accountant/doctor that a message was waiting in his/her mailbox.

- Mail order or other telephone ordering business-

  These types of businesses usually have customers from across the country. Because of time zone problems and the expense of operator salaries, voice messaging can provide an easy way for customers to call in and leave an order. One or two prompts could help the customer enter the specifications required to process the order. The order could subsequently be taken off the system and processed. Because they can call anytime of the day or night and not get a busy signal or be put on hold, customers would be better served and more satisfied.

- Universities-

  Because so much of a professor's time must be spent away from the office and in the classroom, a voice messaging system would be an ideal way for students to contact their professor. In addition, administrative activities could be facilitated with a voice messaging system. Class registration at the beginning of every term could be greatly streamlined with an interactive voice processing system, routine campus information could be provided to students and faculty through a listen-only voice mail box.

Another possibility might even be to offer each student a voice mailbox. Faculty could easily contact students, parents could contact their children, and students could use their voice mailboxes to leave messages to themselves to remind them of upcoming activities, exams, etc.

- Real estate companies-

  When buying or selling a house, nothing is more aggravating than being unable to contact your real estate agent when you have a crucial question. Clients frequently need to discuss various aspects of a buying or selling arrangement with their agent, but it's usually very difficult to contact the agent, and typically the agent's office has no idea where the agent is or when the agent will return. Agents spend so much time in their car and showing various houses to potential buyers, that a voice messaging system (possibly in conjunction with a pager) would greatly facilitate communication between agents and their clients. This could be a major selling point for a real estate company in trying to differentiate itself from its competitors.

- Newspaper/magazines-

  The taking of classified advertisements over the phone could be greatly streamlined by the use of a voice messaging system. Callers wishing to place an advertisement could simply call up the voice mail system and be given the rates and instructed exactly how to place the ad. Callers would be able to

listen to their message and reword it if necessary. This would level the traffic load of the person keying in the advertisement. The messages could be retrieved in a steady fashion throughout the day, reducing the need for more operators during peak hours.

With a little imagination these applications suggest how voice messaging might be used in practically any business environment, including such diverse industries as banking/investment, manufacturing, insurance, travel/tourism/lodging, construction, wholesale/retail, recreation services, museums, membership organizations, and restaurants/entertainment. In general, any business with an emphasis on customer satisfaction, productivity, or interpersonal communications could benefit from voice messaging.

BENEFITS

Cost Savings--Besides the savings that result from increased productivity, discussed in detail below, voice messaging systems can save a company money in two main areas. Monthly telephone bills and costs associated with inbound call handling can be cut.

Saving on telephone bills:

- Monthly telephone bills can be reduced by as much as 30 percent a month. Since on average only 50 percent of all calls require a two-way conversation, the absolute number of outbound calls can be reduced significantly. This results from messages left by inbound calls that require no return call.

- In addition, charges for inbound calls paid by the company can also be greatly reduced by shortening the calls themselves, moving calls to non-peak hours, and reducing call backs due to less telephone tag.

Savings on inbound call handling:

- Savings on inbound call handling can be derived in at least two ways. With a voice mail system, there is significantly reduced demand for a telephone attendant. For even small companies, this could eliminate the cost of one attendant position, saving the company as much as $20,000 a year. In addition, the costs associated with an after-hours answering service can be eliminated, saving the company another $5,000 or so.

Increased Productivity--Implementation of a voice mail system can dramatically improve the productivity of a business. Through time and effort saving aspects of voice messaging, individuals can devote more energy to more gainful aspects of a business.

Productivity increases of support personnel:

- Support personnel such as secretaries, receptionists, and assistants can devote more of their time to aspects of their jobs that are more important than taking messages and trying to track down the staff. With voice messaging systems, the staff or manager can access their voice mailboxes wherever they are and can change their voice mailbox messages to reflect when they will return and any other pertinent information. In addition, when they do return there will be an indication that there is a message waiting (type of indication varies with by system).

- Other time/effort savings can be gained by support staff if staff memos are issued through the internal message broadcast capability of voice mail rather than dictating the memos and having the secretary type them out.

Productivity increases of field personnel:

- Voice messaging can be a significant aid to field personnel such as sales representatives, field technicians, delivery personnel and others who spend a significant portion of their time away from an office environment. There are frequently occasions when field personnel need to receive

instructions. These instructions can be put into the field personnel's voice mailbox and remotely retrieved and acted on. This method is much more efficient than calling in to talk to a dispatcher. The field person never gets a busy signal, never has to wait on hold, and is able to keep the call very short by eliminating chitchat.

- In addition, the field personnel can call in and leave instructions for the support staff, dispatcher, manager, etc. The sales rep can call in orders, sales reports, and contract instructions. Field technicians can report any scheduling problems, part-ordering instructions, and other noncritical status information.

Productivity increases of professional staff:

- The professional staff can also exhibit significant increased productivity as a result of the implementation of a voice messaging system. Messages can be retrieved without having to remember to stop by the message desk. While travelling, or for other reasons, letters and other documents with processing instructions can be dictated into the secretary's voice mailbox at any time day or night. In addition, while in the office, professionals not wanting to be disturbed can let the voice mailbox pick up all calls for later screening and callback.

Increased Customer Satisfaction--Another of the main benefits of a installing a voice messaging system is the dramatic increase in the customer satisfaction that will result. Customers can call in, virtually never have to be put on hold, be greeted pleasantly and professionally, and be confident that they will get through to exactly the right person and be able to leave a message with some assurance that they they have taken the appropriate action.

Customer complaints-

- Customer complaints can be handled efficiently, smoothly, and regardless of the customer's temperament, without incident. A customer can call in, be instructed on how to leave a complaint, and be told when the complaint will be acted on. The customer will be satisfied because he will feel confident that he has taken the correct action and that the matter will be handled correctly.

Customer information-

- Customer information can be very effectively handled with a voice mail system. The customer can call in and listen to a general information message. If the question the customer has is more specific, he/she can be instructed to leave a message and be informed that an operator will call back during a specified time frame.

Customer orders-

- Customer orders can be handled very efficiently with a voice messaging system. The customer can call in and listen to a message that gives complete instructions on how to enter in an order. One clear advantage is that for businesses with national "800" numbers, customers can call in any time from any time zone and be able to order a product and be confident that the order will be appropriately handled.

If properly implemented, voice processing can provide many financial and nonfinancial benefits to a company. Financial benefits include both cost reduction aspects and revenue enhancing aspects. Nonfinancial aspects are harder to measure, but are nonetheless very important. Voice processing can greatly enhance customer satisfaction. This can lead to more repeat business and increased lead generation.

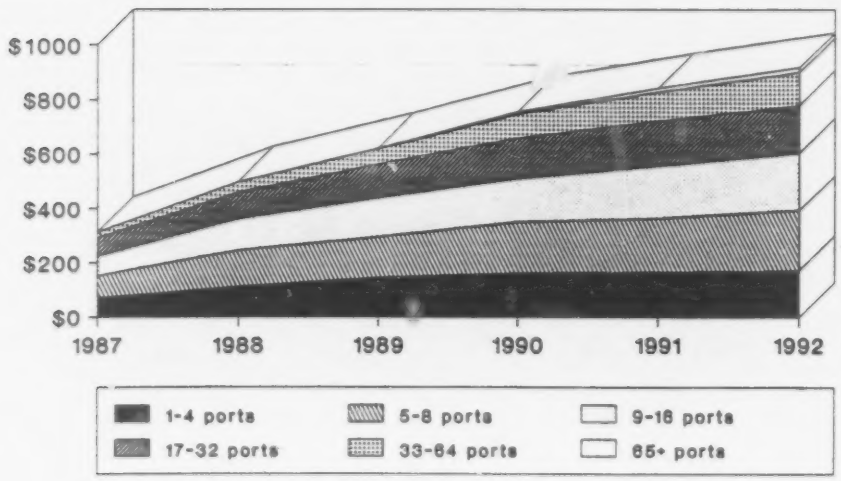
MARKET TRENDS

MARKET TRENDS

The voice processing industry is dynamic and growing. The market for voice processing systems has soared from virtually nothing less than a decade ago to a $500 million market by 1988. Moreover, projections indicate that the market will approach $1 billion by 1992 (see Figure 1). The industry has grown to include dozens of suppliers. This vitality is being influenced by a number of factors. Technology is developing rapidly, allowing greater and greater capacity from smaller and smaller machines. Regulatory developments have added a new dimension to the picture by allowing the Regional Bell Operating Companies (RBOCs) to begin offering voice messaging services. This is stimulating competition in the service bureau industry, already a very active segment of the marketplace. Standards are being developed to allow a voice messaging system from one manufacturer to communicate with a system from another manufacturer. Combined, these forces are expanding the voice processing marketplace, providing vast opportunities for manufacturers and distributors.

FIGURE 1

Annual Sales Of Voice Processing System, 1987-92
(In $ Millions)



OVERVIEW

The current market for voice processing systems is characterized by high growth and declining prices, not unlike the market development of other electronic products where strong competitive forces, combined with technological advances and increasing economies of scale, allow for significant price decreases as user penetration increases. In one year alone, sales increased by more than 75 percent and average unit prices declined by almost 15 percent. Overall, annual sales of voice processing systems soared from slightly over 7,000 units valued at $315 million in 1987 to 12,396 units valued at $500 million in 1988 (see Table 1, p. 26). The market for 1989 is estimated to amount to 17,335 units valued at $623 million. For the period 1987-89 this translates into annual growth rates of 56 percent and 41 percent for units and value, respectively. Average prices of voice processing systems during this period have fallen by 11 percent per year.

For the near future, the rate of sales of voice processing equipment should begin to grow somewhat more slowly as the marketplace matures. In addition, price competition will begin to accelerate as pent-up demand is met and price becomes more of an issue. Sales of voice processing systems are expected to continue to grow between 1990 and 1992, but at a decreasing rate. In terms of units, voice processing systems are expected to expand by 27 percent per year from 23,785 in 1990 to 38,095 by 1992 (see Table 2, p. 27). In terms of value, the growth of the market will be even slower at 10 percent per year from $755 million in 1990 to $917 million in 1992. Price decreases are expected to average about 13 percent per year during 1990-92.

In terms of unit sales, the largest segment of the market is represented by systems of 4 ports or less. In 1988, that segment accounted for 57 percent of total sales (see Figure 2, p. 24). The next biggest sellers were systems with 5-8 ports, with 21 percent; then systems with 9-16 ports, at 16 percent. In terms of value, the split is more evenly distributed, with systems having 5-8 ports accounting for 26 percent, and systems having 4 ports or less, those having 9-16 ports, and those having 17-32 each accounting for between 20 and 23 percent of the total (see Figure 3, p. 24).

FIGURE 2

1988 Voice Processing Market, In Units, By System Size

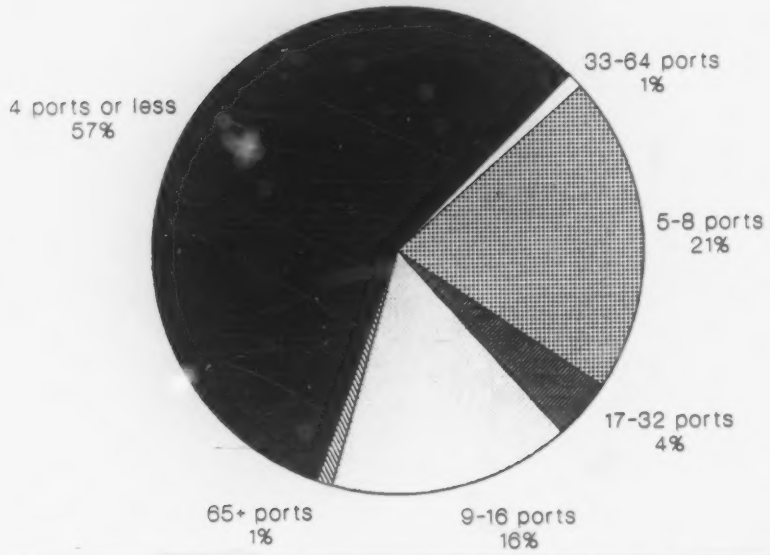
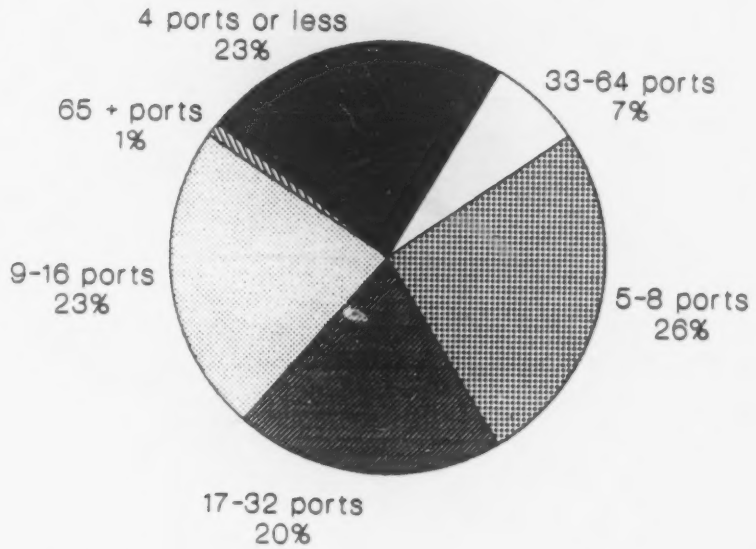


FIGURE 3

1988 Voice Processing Market, In Value, By System Size



The composition of the voice processing marketplace is expected to evolve slowly over the next few years as different segments mature. The smallest systems will continue to be the biggest sellers, but in terms of value will represent increasingly less of the market. This is principally due to more rapidly declining prices in that segment--about 18 percent per year during 1990-92. Sales of systems at the higher end of the spectrum--65 ports and over--will experience the most rapid growth in market penetration. Price declines are expected to be minimal, at about 7 percent per year.

TABLE 1
ESTIMATED ANNUAL SALES OF VOICE PROCESSING SYSTEMS, 1987-89

	1987	1988	1989	CAGR* 1987-89
1 to 4 Ports:				
Units ... No.	4,050	7,128	10,600	62%
Value ... $ Mil.....	73	115	150	43%
Unit Value... $Thous..	18	16	14	-12%
5 to 8 Ports:				
Units ... No.	1,550	2,625	3,200	44%
Value ... $ Mil.....	80	130	147	35%
Unit Value... $Thous..	52	50	46	- 6%
9 to 16 Ports:				
Units ... No.	1,100	2,000	2,600	54%
Value ... $ Mil.....	72	117	143	41%
Unit Value... $Thous..	65	59	55	- 8%
17 to 32 Ports:				
Units ... No.	300	500	700	53%
Value ... $ Mil.....	68	100	123	34%
Unit Value... $Thous..	227	200	176	-12%
33 to 64 Ports:				
Units ... No.	70	135	220	77%
Value ... $ Mil.....	20	35	55	66%
Unit Value... $Thous..	285	260	250	- 7%
65 + Ports:				
Units ... No.	4	8	15	94%
Value ... $ Mil.....	2	3	5	59%
Unit Value... $Thous..	390	375	360	- 4%
Total:				
Units ... No.	7,074	12,396	17,335	56%
Value ... $ Mil.....	315	500	623	41%
Unit Value... $Thous..	45	40	36	- 11%

*Compound Annual Growth Rate

Source: NATA Market Research Department based on various industry sources.

TABLE 2
PROJECTED ANNUAL SALES OF VOICE PROCESSING SYSTEMS, 1990-92

	1990	1991	1992	CAGR* 1990-92
1 to 4 Ports:				
Units ... No.	14,310	17,000	23,000	27%
Value ... $ Mil.....	165	170	173	2%
Unit Value... $Thous..	12	10	8	- 18%
5 to 8 Ports:				
Units ... No.	4,900	6,300	8,200	29%
Value ... $ Mil.....	186	195	221	10%
Unit Value... $Thous..	38	31	27	-16%
9 to 16 Ports:				
Units ... No.	3,200	4,000	4,700	21%
Value ... $ Mil.....	160	192	210	15%
Unit Value... $Thous..	50	48	45	- 5%
17 to 32 Ports:				
Units ... No.	1,000	1,300	1,600	26%
Value ... $ Mil.....	150	165	175	8%
Unit Value... $Thous..	150	127	110	- 14%
33 to 64 Ports:				
Units ... No.	350	450	535	25%
Value ... $ Mil.....	85	105	120	19%
Unit Value... $Thous..	243	233	224	- 4%
65 + Ports:				
Units ... No.	25	45	60	55%
Value ... $ Mil.....	9	15	18	41%
Unit Value... $Thous..	350	333	300	- 7%
Total:				
Units ... No.	23,785	29,095	38,095	27%
Value ... $ Mil.....	775	842	917	10%
Unit Value... $ Thous..	32	29	24	- 13%

*Compound Annual Growth Rate

Source: NATA Market Research Department based on various industry sources.

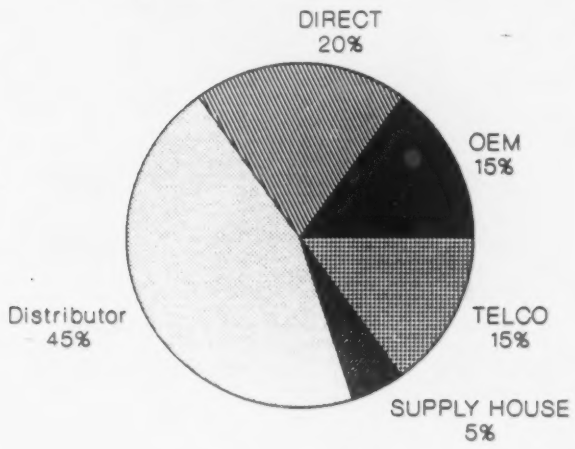
DISTRIBUTION CHANNELS

Voice processing systems are sold through several different channels. These are typically the same distribution channels used with other business telephone systems; i.e., manufacturer direct, OEM arrangement, telephone company, supply house, and authorized distributor, including interconnect vendor. Sales through authorized distributors, principally interconnect vendors, represent the largest distribution channel, accounting for about 45 percent of manufacturer sales (see Figure 4). Manufacturer direct sales account for about 20 percent, while OEM arrangements and sales to telcos account for 15 percent, each. Wholesale supply houses account for the balance.

In general, manufacturers tend to sell very large systems directly to end users. These customers include those with very large installations, such as large universities and voice messaging service bureaus that provide voice mail boxes to the public (addressed in more detail later). In addition, they usually reserve national accounts for their own sales personnel. As the market for voice processing systems has heated up, distribution through interconnects and other third parties has become crucial. This trend will continue as competition intensifies.

FIGURE 4

1988 Sales Of Voice Processing Systems, By Distribution Channel



INSTALLED BASE DEVELOPMENT

The installed base of voice processing systems has expanded rapidly at an average rate of 83 percent, from 9,925 systems in 1987 to 33,251 by 1989 (see Table 3, p. 30). As the market begins to mature and pent-up demand becomes satisfied, this growth is expected to slow somewhat to an average of 29 percent per year during 1990-92, from 48,024 systems to 79,716 (see Table 4, p. 30). In addition, as the technology becomes more refined and older models become obsolete, retirements from the installed base should also begin to increase somewhat.

As smaller systems become more pervasive, the average number of ports of all systems, collectively, will decrease from 8.3 ports in 1987 to 7.6 ports in 1989. Beginning in 1990, the average number of ports will stabilize and then begin to increase, as the installed base of larger systems begins to drive the average up. As the marketplace develops, the system configurations of the various-sized systems will also evolve.

As users find more and more applications for their installed voice messaging systems, they will need their systems upgraded to handle more capacity. In general, the average number of ports per system will increase. For example, the average number of ports of the largest system size--65 ports and above--is projected to grow from 72.0 ports per system in 1987 to 89.3 ports per system by 1992 (see Table 5, p. 31). Roughly 8 percent of the annual sales of all ports are add-on ports for system upgrades.

TABLE 3
ESTIMATED INSTALLED BASE OF VOICE PROCESSING SYSTEMS,
BY SYSTEM SIZE, 1987-89

	1987	1988	1989	CAGR* 1987-89
1 to 4 Ports	4,795	11,144	19,139	100%
5 to 8 Ports	2,422	4,578	6,747	66%
9 to 16 Ports	2,014	3,603	5,495	65%
17 to 32 Ports	531	923	1,423	63%
33 to 64 Ports	156	259	417	63%
65 + Ports	7	15	30	107%
Total	9,925	20,522	33,251	83%

*Compound Annual Growth Rate

Source: NATA Market Research Department based on various industry sources.

TABLE 4
PROJECTED INSTALLED BASE DEVELOPMENT OF VOICE PROCESSING
SYSTEMS, BY SYSTEM SIZE, 1990-92

	1990	1991	1992	CAGR* 1990-92
1 to 4 Ports	28,039	36,065	45,948	28%
5 to 8 Ports	9,670	12,750	16,254	30%
9 to 16 Ports	7,579	9,950	12,425	28%
17 to 32 Ports	2,076	2,830	3,649	33%
33 to 64 Ports	655	1,012	1,294	41%
65 + Ports	54	96	146	64%
Total	48,073	62,703	79,716	29%

*Compound Annual Growth Rate

Source: NATA Market Research Department based on various industry sources.

TABLE 5
AVERAGE NUMBER OF PORTS PER VOICE PROCESSING SYSTEM
BY SYSTEM SIZE

	1987	1988	1989	1990	1991	1992
1 to 4 Ports	2.6	3.4	3.8	4.0	4.0	4.0
5 to 8 Ports	7.2	7.4	7.4	7.5	7.5	7.5
9 to 16 Ports	12.3	13.5	14.5	14.5	15.3	15.3
17 to 32 Ports	24.8	25.4	26.6	26.6	26.6	28.0
33 to 64 Ports	46.7	46.7	47.0	49.0	50.4	51.3
65 + Ports	72.0	75.3	79.4	83.2	85.0	89.3
Average	8.3	7.8	7.6	7.6	7.7	7.8

Source: NATA Market Research Department based on various industry sources.

REGIONAL BELL OPERAING COMPANIES' (RBOCS') STRATEGIES

REGIONAL BELL OPERATING COMPANIES' (RBOCS') STRATEGIES

As part of the Modified Final Judgement (MFJ) of the agreement divesting the Bell Operating Companies (BOCs) from AT&T, the RBOCs were precluded from various activities, including the provision of information services, one of which is voice messaging services. In 1978, at the occasion of the triennial review of the MFJ, Judge Harold Greene, presiding over the administering court, ruled, **inter alia**, that the RBOCs could begin to provide certain information services. On March 8, 1988, Judge Greene further clarified and specified that the RBOCs could begin to offer voice messaging services and gateway transmission services for other information services.

Despite Judge Greene's ruling, the RBOCs were subject to restrictions initiated earlier by the Federal Communications Commission (FCC) that stipulated that before the RBOCs can offer an enhanced service, such as voice messaging, in the course of normal business, they must submit specific plans to the FCC. These are known as comparably efficient interconnection (CEI) plans. By year-end 1988, 15 CEI plans had been submitted, of which six have been approved.

In addition to being able to provide voice messaging services themselves, the RBOCs also market voice messaging equipment through their CPE distribution channels.

- Southwestern Bell markets the VMX 1000 and VMX 5000.
- Bell Atlantic and Pacific Telesis market the Octel Aspen and Aspen Branch systems.
- BellSouth markets the Digital Sound VoiceServer and the VMX 1000 and VMX 5000.
- Ameritech markets the VMX 1000 and VMX 5000. The company also markets Centigram's Voice Memo II.

- NYNEX markets the Wang Digital Voice Exchange and the VMX 1000 and VMX 5000.

- U.S. West markets the Applied Voice Technology CallXpress, the Genesis Electronics Cindy II and III, and the VMX 1000 and VMX 5000.

Despite the fact that the RBOCs offer voice messaging CPE, the greatest potential impact of the RBOCs will be as a result of their voice messaging service business. The likely outcome of their entry into this business is the opening up of the untapped residential market. At least in the short term, this is likely to open business opportunities for all concerned. Below is a listing of the status of each RBOC's entry into the voice messaging service business. The information is current as of May 1989.

AMERITECH

Ameritech's voice messaging plans are two-fold. In October 1988, Ameritech bought 100 percent interest in Tigon Corp., one of the largest nationwide full-service voice messaging service providers. Tigon has centers in Atlanta, Chicago, Dallas, Denver, Detroit, Los Angeles, New York, Philadelphia, San Francisco, and Stamford, Connecticut and offers service in 27 other U.S. cities, and through affiliation with other companies, the United Kingdom and Japan. Major U.S. customers include Kodak, General Foods, Ford, Texas Instruments, and Southern New England Telephone.

In addition, Ameritech has begun voice messaging trials in Milwaukee, Wisconsin, and has announced plans to conduct trials later in 1989 in Chicago, Indianapolis, Detroit, and Columbus. With the Milwaukee trial, Ameritech is providing the transport to a third party voice messaging services provider, All City Communications Co., and billing services. This trial, which began in January 1989, will last nine months. The service is available to 30,000 Wisconsin Bell Customers and is offered in three versions.

- Message Manager--This service will store 20 messages for up to 15 days if the customer has not listened to them. The service costs $6 per month for residential customers and $12 per month for business customers.

- Message Manager Alert--This, more advanced service, stores 30 messages up to 15 days and provides remote message alert to a customer's predesignated alternate phone number. This service costs $10 per month for residential users and $20 per month for business users.

- Voice Messenger--This service is a premium feature that can be added to either of the above two services. It allows users to record messages that can be delivered at a later time. The user can choose to broadcast a message to as many as 15 predesignated phone numbers. An "urgent" feature is included that will ring those numbers every 30 minutes until the call is answered. This feature costs an extra $5 per month for a residential customer and $12 per month for a business customer.

Ameritech has chosen these voice messaging strategies for several reasons. Because the company offers the service either through a separate subsidiary, Tigon, or through an arrangement with an unaffiliated company, All City Communications, Ameritech can avoid filing CEI plans with the FCC. In addition, the capital expenditure associated with testing the market is minimized. The equipment utilized in the Milwaukee trial was supplied by BBL Industries.

Ameritech plans to offer voice messaging service to its cellular subscribers later in 1989 using equipment supplied by Octel. Tigon has been providing voice messaging service to Ameritech's cellular subscribers since 1986 under an earlier agreement.

BELL ATLANTIC

Bell Atlantic's CEI plan for voice messaging includes three types of service: telephone answering, voice mail, and call delivery.

- Telephone Answering--This service is oriented to the residential subscriber. It will provide automated telephone answering under busy or no-answer conditions, prompting by subscribers' pre-recorded greetings, touch-tone retrieval, and message notification via stutter dial tone (a dial tone with intermittent breaks) or a message waiting lamp. The market price for this service during the trial period is $5.00 per month.

- Voice Mail--This service will be oriented towards small business. It will be a 24-hour telephone answering and message store-and-forward service. Features will include priority message delivery in standard, urgent, and private categories. In addition, the service will include call transfer and provide remote notification to a predesignated telephone number. The market price for this service during the trial period is $7.50 per month.

- Call Delivery--This service will be oriented towards the occasional user. The service will allow callers to dial an intraLATA telephone number and leave a message that will be delivered at a later time specified by the caller. The price of this service remains unannounced.

Bell Atlantic conducted tests of the telephone answering and voice mail services in early 1989 in northern New Jersey and Germantown, Maryland using equipment purchased from Boston Technology. Trials of its call delivery service are planned for later in the year. The company expects full implementation during 1989. In addition, Bell Atlantic has been offering voice messaging service since November 1988 to its cellular subscribers.

BELL SOUTH

BellSouth received FCC approval of its voice messaging CEI plan in March 1989. Almost immediately after getting approval, the company began several trials of voice processing services. At Samuel Inman Middle School in Atlanta, BellSouth initiated a audiotex voice service whereby parents can call a voice mailbox and obtain information on what their child's assignments are, what's on the school lunch menu, PTA notices, school activities, and school closing changes. The service is free during the trial, which will last at least through the end of 1989. Similar trials with other public schools are being conducted in Huntsville, Alabama and Nashville, Tennessee.

In addition, in March 1989, BellSouth initiated a 6-month trial of voice messaging service for business customers in West Palm Beach, Florida. The service, called Memory Call has three categories of service:

- Call Answering--Includes 10 messages with 2-minute lengths and a 7-day retention period. The price for the service is $7 per month.

- Voice Messaging--Includes 30 messages with 5-minute lengths and a 7-day retention period. The price of the service is $12 per month.

- Combined Call Answering/Voice Messaging--Includes 30 messages with 5-minute lengths and a 7-day retention period. The price for the service can be discounted based on the number of mailboxes--$15 per month for 1-49 mailboxes and $12.50 per month for 50 mailboxes or more.

For each package, the rate specified is for a fixed amount of storage capacity. Beyond that, the fee is 8 cents per minute. Call forwarding can be added to any of the packages for $3.50 per month.

NYNEX

NYNEX received FCC approval of its CEI plan for the provision of voice messaging services in February 1989. The company, which has had voice messaging internally since Spring 1988, plans to begin a technical trial with a large undisclosed customer during the Spring of 1989. NYNEX plans to begin commercial voice messaging services in the New York City and Boston metropolitan areas. The company expects the service to start up in the Fall 1989. NYNEX will offer call answering to residential customers and small businesses for $6.00 and $12.00, respectively. Full voice messaging service will be available to business customers at $8.00 per month. Subscription to both telephone answering and voice mail will be $15.00 per month. The equipment is supplied by Octel.

For its cellular subscribers, NYNEX signed an agreement with Dialogue Inc. at year end 1988, to supply voice messaging equipment manufactured by Boston Technology The voice messaging service is scheduled to begin sometime during the first half of 1989.

PACIFIC TELESIS

Through Pacific Bell, Pacific Telesis received conditional FCC approval for its voice messaging CEI plan in January 1988. On March 31, 1989, Pacific Bell began a test of call answering and mailbox messaging services to residential and small business subscribers in Milpitas and San Pedro, California. The company offers two types of service: call answering and local messaging.

- Call Answering--With this service callers encounter a greeting of up to 45 seconds and can record a message of up to 3 minutes. The basic monthly charge for this service for residential customers is $7.50 and $6.00 for Milpitas and San Pedro, respectively. For business customers, the basic monthly charge for the two locations is $15.00 and $12.00, respectively.

- Local Messaging--With this service, subscribers can send messages of up to 3 minutes directly to individual subscribers' mailboxes or broadcast the message to a group of subscribers with a predesignated group code. The basic charge for this service for residential and business customers is $.25 for the first message and $.15 for each additional message for both cities. The service also provides for up to 8 optional sub-mailboxes, which can be considered as extensions. The charge for extensions for residential customers is $1.50 each for both cities. For business customers the charge for extensions is $5.00 each for both cities.

Pacific Bell expects the trials to last 6-12 months before evaluating possible product rollouts for the rest of the state. To ensure a good chance of success, the company has initiated an extensive marketing campaign in both areas, including telemarketing and local advertising. Pacific Bell is using equipment supplied by Octel.

In addition, Pacific Bell announced the launch of voice messaging service to medium and large business users at the end of 1988. Initially it will be available in the San Francisco area, but Pacific Bell expects the service to be expanded to Los Angeles, Sacramento, and San Diego by July 1989 and throughout California by 1990. Pacific Bell is using equipment from Digital Sound for this offering.

The company has offered three service options based on system size. The company calls these services System 200, System 100, and System 50.

- System 200--This service offering is for customers wanting more than 200 voice mailboxes. This plan is only offered to customers that have centrex systems installed. It is priced per port. Configurations of 1 to 8 ports costs $200 per

port per month; 9-16 ports cost $175 per port per month; 17 ports or more cost $150 per port per month. The initial installation fee is $100 per port for any of the systems. In addition, there is a charge of $150 per hour per month for storage and $100 initial storage installation fee.

- System 100--This offering is for customers needing 100-200 mailboxes. It is also available only to customers with centrex systems. The fee for this plan is based on the number of mailboxes. The charge is $10 per mailbox per month with a one-time $15 per mailbox installation fee plus a charge of $.10 for every minute of storage per month.

- System 50--This offering is for customers needing less than 100 mailboxes. It is available to all customers regardless of the phone system. The charge is $19.95 per mailbox for systems of 1-24 mailboxes and $15 per month for systems having 25-99 mailboxes. There is an initial installation fee of $15 per mailbox and $.10 for every minute of storage per month.

SOUTHWESTERN BELL

Southwestern Bell received FCC approval of its CEI plan in September 1988. The company has initiated seven voice messaging trials, at least one in every state of its territory. As of this writing, some of the trials are completed. It is not charging for the service in any of the trials. The company is principally seeking public reaction to the service. In addition, each site has some unique characteristic that offers a challenge to Southwestern Bell. The company wants to trial several possible situations before implementing the service across its territory. The trials have been conducted in Kansas City, Little Rock, Oklahoma City, Austin, Fort Worth, St. Louis, and Waco, Texas. All trials except the one in Waco have used Octel equipment. The equipment used in Waco is by Digital Sound.

- Kansas City--Voice messaging service was begun in August at Kansas City's Blue Valley school district. About 250 teachers, 30 administrators, and 80 percent of the parents

were given the service. The expectation is that there will be increased communication between parent and teacher, which should lead to a more coordinated approach to the children's education. The test is scheduled for completion at the end of the school year.

- Little Rock--Trial service in Little Rock ran between September 1988 and January 1989. Southwestern Bell chose this site to conduct a trial of residential customers.

- Oklahoma City--Trial service in Oklahoma City ran between September, 1988 and January 1989. The company chose the Oklahoma City trial to test the viability of a voice messaging center remote from the central office and connected to the central office by cable.

- Austin and Fort Worth--Trial service for these cities was initiated in October 1988. Southwestern Bell used these cities to test the acceptance of voice messaging in largely high-tech environments where consumers are used to advanced technology. The Austin trial was due for completion in February 1989. The Fort Worth trial was scheduled for completion in April 1989.

- St. Louis--This site was the first trial site. Service was begun June 27, 1988. The test was Southwestern Bells first attempt at providing voice messaging service and includes 270 Southwestern employees and former employees. The St. Louis trial has no slated completion date.

U.S. WEST

U.S. West received FCC approval of its voice messaging CEI plan in early 1989. Once approved, the company immediately started up voice messaging service in Boise, Idaho. The service costs $6.95 per month, and has no limit to the number of messages, message lengths or message retention. As with virtually all voice messaging systems, the only requirement is that the user have a touch-tone telephone. The service has been positioned to replace the residential telephone answering machine, and its features are very basic. There is no broadcasting, future delivery, group hunting, or mailbox

messaging. Message waiting indication is handled via stutter dial tone. U.S. West is using equipment supplied by Octel.

VOICE MESSAGING SERVICE BUREAUS

VOICE MESSAGING SERVICE BUREAUS

The main immediate impact of the RBOCs' being allowed to provide voice messaging services will be felt on the independent voice messaging service bureaus. These companies will likely be in direct competition with the RBOCs once the RBOCs get their systems fully operational. In addition, there is the potential for already established services bureaus to be bought by an RBOC, like Tigon was.

Voice messaging service bureaus usually operate in metropolitan areas, where they are convenient to a large number of businesses. The company owns a voice messaging system and rents the voice mailboxes to individual subscribers (typical fees are $15-$20 per month). Typical service includes simple telephone answering, message broadcast, and outdialing (to a pager, for instance). Service Bureaus are especially useful to small businesses that cannot justify the expense of owning their own system, and to businesses that have many small offices, none of which is big enough to warrant the purchase of equipment. Large companies might use service bureaus as a way to test the effectiveness of voice messaging before committing to purchasing the equipment.

Voice messaging service bureaus are located in most U.S. cities today. There are currently some 100,000 subscribers to voice messaging services, generating some $100 million in revenue to the service bureau industry. Most users today are businesses. Entry into the industry by the RBOCs will have the effect of providing service bureaus with competition, but overshadowing that, is the fact that the RBOCs will likely open up the massive residential market. Service bureaus will likely benefit greatly from these market-opening efforts.

STANDARDS

STANDARDS

As the popularity of voice messaging systems has increased, the need for networking systems has become more prevalent. Networking between systems made by the same manufacturer is typically not a problem. The problems arise when systems from different manufacturers attempt to communicate.

In addition, there is a desire developing in the user community for standard user interfaces; e.g., the "*" button's activating the same feature on all systems. Currently, users must be retrained to activate voice messaging options for virtually every system. If there were standards for at least some of the most common features, users would feel more comfortable with the systems and acceptance would likely increase.

Finally, problems are arising in attempting to interface voice messaging equipment with other office automation products. There is currently no standard interface between voice messaging and electronic mail, facsimile, or other devices that could provide a multi-media communications solution.

o Networking

In September 1988, the Audio Message Interchange Standard (AMIS) committee was formed to establish an intervendor networking standard for voice messaging systems. The AMIS concept had its roots in 1987 when Coca Cola wanted to be able to network IBM/Rolm systems with VMX systems that the company had in various locations.

The project expanded to include other large multi-location users, other equipment vendors, and several national voice messaging service providers. In June 1988, the committee formed an alliance with the Information Industries Association (IIA) and began to meet and conduct business as an IIA committee under their auspices. The initial thrust of the AMIS project was to develop an analog internetworking signal standard, with the plan to then proceed to a digital standard. At a meeting in December 1988 (and confirmed

at an April 1989 meeting), the AMIS committee voted to abandon an analog standard, and move directly to the development of a digital standard. That standard is likely to be proposed sometime during 1989.

- User Interface

  As part of IIA's efforts to standardize user interfaces, the Voice Information Subcommittee is developing a set of common user interfaces for some of the most rudimentary features of voice messaging. In addition, the subcommittee is attempting to develop common terminology so that users understand which features have what characteristics. Bellcore is also working on the project and produced a recommendation it submitted to the IIA subcommittee in April 1989. The proposal is likely to be circulated to members for comment and acted on later in the year.

- Interface With Other Equipment

  To date, there has been very little coordinated effort to develop standards for voice messaging interface with other communication media, such as electronic mail or facsimile. Some of the larger manufacturers have begun to develop communication interface capability for their own products, but there are no known efforts to date to coordinate those interfaces into an industry standard.

EQUIPMENT VENDORS

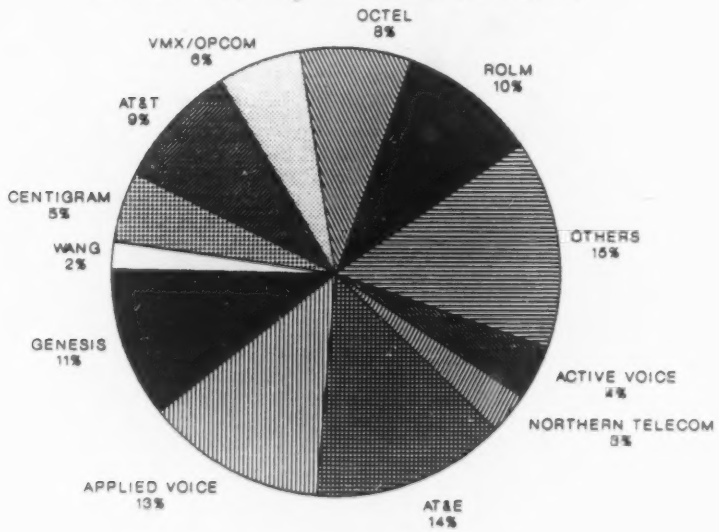
EQUIPMENT VENDORS

There are currently some 44 vendors of voice processing equipment. These suppliers are as diverse in company characteristics and marketing strategies as the products they sell. They range in size from multi-product giants like AT&T and ROLM/IBM/Siemens to specialized niche manufacturers like Miami Voice. Probably the largest independent company devoted to voice processing products is VMX/Opcom. (VMX founded the industry in the early 1980s and merged with Opcom in 1988.) Other significant players are Octel (recently purchased by Hewlett Packard), Centigram, and Wang (widely known for its word processing, personal computers, and other office automation products).

Figure 5 and figure 6 (see p. 49) give 1988 estimated manufacturer market share for units shipped and value sold, respectively. In addition, the appendix gives a vendor-by-vendor, product-by-product breakdown of available equipment.

FIGURE 5

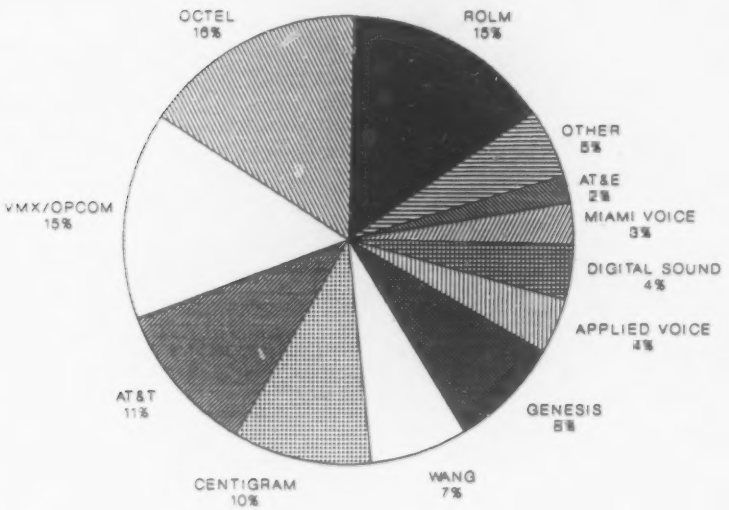
1988 Voice Processing Market, in Units, by Manufacturer



Total Market = 12,396 Systems

FIGURE 6

1988 Voice Processing Market, in Value, by Manufacturer



Total Market-$500 Million

FUTURE TRENDS

FUTURE TRENDS

Voice processing, the bridge between call processing and data processing, greatly enhances the flexibility of people-to-people communication and people-to-computer communication. Its value in people to people communications stems from the ability to provide interactive messaging, message delivery, telephone answering, and call routing. The principal people-to-computer functions include automated information collecting, information providing, and transaction processing.

The applications for voice processing are limited only by the imagination. Virtually every business could benefit from voice processing implementation. Companies ranging in size from small, one-person operations to huge, multi-billion dollar conglomerates have found that the use of voice processing has improved customer satisfaction, improved employee productivity, increased sales, and had a net positive effect on the bottom line.

However, voice processing has only begun to fulfill its potential of facilitating personal and business communications. Currently, voice messaging is the predominant application of voice processing, but as the technology advances and users become more comfortable with automated call handling, the applications for voice processing will increase tremendously.

Technologies on the drawing board for release in the next several years include speech recognition, speech synthesis, and automatic foreign language translation. These advancements, coupled with the evolving integration of voice processing and other office systems; and the continual improvements in semiconductor technology, allowing for more and more storage and computing capacity, will lead to a revolution in the way we communicate.

There are still critical issues facing the voice processing industry before the technology can completely fulfill its potential. These include the development of standards, proper training of personnel, and a heightened awareness by vendors and

users of how to use voice messaging as a strategic communications tool. In addition, the way that the RBOCs implement their own voice processing services will have a dramatic impact on the rest of the industry.

- Standards are crucial to ensure that users of voice processing can network equipment of different vendors to fully utilize their systems. In addition, the development of protocol standards interfacing voice processing systems with other office systems will dramatically enhance the capability of all the different systems. Also, user interface standards are important to achieve a high level of consumer acceptance.

  One problem with the development of standards in a competitive environment like the voice processing marketplace, is that competing vendors must work together to develop a common ground. This requires the farsighted view that, in the long run, they will all benefit from increased standardization in much the same way that manufacturers of facsimile terminals have benefitted from having a common transmission standard. With the AMIS project underway, the voice processing vendors have begun to demonstrate this farsightedness.

- Another issue facing the voice processing marketplace is the need for comprehensive user training. It is not nearly enough for a voice processing vendor to merely sell the equipment/service. The vendor should be able to provide training, to make sure that all the employees in the customer's business understand all the features of the system and all the potential benefits that can be derived by full implementation and usage of the system. This will ensure that the vendor's customer will be fully satisfied and will return to the vendor for more products and services. Moreover, this will further the acceptance of the technology itself, which will help to drive the market.

As a corollary, customers should be very thorough in planning the purchase of a voice processing system, implementing the system, and managing the system once its installed. The company should be aggressive in trying to understand all of the functions of the system and all of the potential applications. Customers must be able to foster acceptance of voice processing among their employees to get the most of the system.

- Vendors and users need to become more aware of how voice processing can be integrated into their traditional call processing methods. Voice processing capabilities need to be scrutinized for potential application as strategic business tools. Much more can be achieved in the area of automating call processing functions, but vendors need to more completely understand all of the possible uses of the technology to be better able to find creative ways to solve a company's communications problems.

- Finally, the wild card in this list of critical issues is the question of what effect the RBOCs will have on the voice processing marketplace. In the near term, the most likely outcome will be that the RBOCs will stimulate demand across the board for voice processing products and services. With large promotional budgets, the RBOCs will be able to increase general public awareness of voice processing and the potential benefits. One segment, as yet largely untapped, the residential market, will likely be opened up by the RBOCs. This will familiarize the residential consumer with the various types of service and likely increase general consumer acceptance. This will have a ripple effect to all suppliers of products and services.

The long run effect of RBOC entry is much more difficult to predict. It largely depends on the strategies of the

individual RBOCs and the successes of their various efforts. While the RBOCs do have considerable leverage in the marketplace, they can also be highly bureaucratic and difficult to maneuver. The most likely result will be that the RBOCs will be successful with those customers that like the stability of dealing with the "telephone company," but that in other, highly innovative areas, the RBOCs will not be as successful competing against private vendors of products and services.

In general, voice processing is a technology with a long future ahead. As with the exploding facsimile market, once voice processing reaches a critical mass, it will become more than a convenience and a status product, users will wonder how they got along without it. Consumers reluctance about "talking into a machine," will subside as they enjoy the benefits that voice processing provides.

APPENDIX

SUPPLIERS OF VOICE PROCESSING SYSTEMS

Company/Product Line	No. of Ports	Practical User Capacity	Storage Hours	Price
o Active Voice 101 Stewart St. Seattle, WA 98101 (206) 441-4700				
Repartee	1-16	65,000	72	$3,400-$40,000
o Advanced Voice Technologies 1865 Airplane Dr. Nashville, TN 37210 (615) 885-4170				
CASI	4-8	250	3	$15,900-$19,000
Messenger	4-20	unlimited	2-26	$10,000-$65,000
Memo	4-20	unlimited	4-26	$13,700-$61,000
o Automation Electronics Corp. 11501 Dublin Blvd. Dublin, CA 94568 (800) 232-4653				
MAX Receptionist	2-16	unlimited	2-30	$9,000
o American Digital Voice Systems 719 North Beers St. Suite 2F Holindel, NJ 07733				
Teleserver	4-20	10,000	4-120	$12,000-$22,500
Call Pro	2-8	25-100	2-8	$5,000-8,500
o American Telesystems 7 Piedmont Center Atlanta, GA 30305 (404) 266-2500				
Express Messenger	2-48	10-10,000	2-220	$8,990-$100,000

Company/Product Line	No. of Ports	Practical User Capacity	Storage Hours	Price
o Applied Voice Technology PO Box 70219 Belleview, WA 98007 (206) 641-1760				
CAllXpress	4-16	20-1,000	3-60	$15,000-$90,000
o AT&E Systems One Maritime Plaza Suite 1745 San Francisco, CA 94111				
AT&E	1-2	24	4	$3,500
o AT&T 55 Corporation Dr. Bridgewater, NJ 08807 (201) 658-6000				
Audix (Small System)	16	2,000	40	$116,000
Audix (Large System)	32	4,000	196	$445,000
o BBL Industries 2935 Northeast Pkwy Atlanta, GA 30360 (800) 241-5240				
Modular Voice Processor	128	25,000	528	$45,000-$700,000
o Boston Technology One Kendall Square Cambridge, MA 02139 (800) 333-2678				
Access	32	5,000	110	$27,000-$137,000
Compact	16	500	20	$17,400-$52,000
CO Access	1,536	100,000	7,000	$370,000-$3.7M
o Brooktrout Technology 110 Cedar Street Wellesley Hills, MA 02181 (617) 235-3026				
Operator Plus	2-6	1,000,000	4-24	$3,995 and up

Company/Product Line	No. of Ports	Practical User Capacity	Storage Hours	Price
o Centigram 4415 Fortran Ct. San Jose, CA 95134 (408) 942-3500				
Voicememo II	20-120	10,000	5-960	$29,900 and up
Voicememo VS	2-8	200	3-9	$17,500 and up
o Code-A-Phone 16261 SE 130th St. Clackamas, OR 97015 (503) 655-8940				
PVM-4260	1	1	.5	$270
o Computer Integration Associates 123 White Oak Land Old Bridge, NJ 08857 (201) 679-9500				
Multi-Message	1-200	1-10,000	4-140	$8,995-$250,000
o Comverse Technology 400 Crossways Park Drive Woodbury, NY 11797 (312) 699-8558				
Trilogue	4-32	5,000	8-170	$35,000-$200,000
o Digital Sound 2030 Alemeda Padee Serra Santa Barbara, CA 93103 (805) 569-0700				
Voiceserver 1000	2-8	1,000	34	$20,000-$45,000
Voiceserver 2000	2-20	3,000	128	$40,000-$15,000
o Digital Speech Systems 1840 N. Greenville Ave., #156 Richardson, TX 75081 (214) 235-2999				
TMX 32/5000	4-32	5,000	4-33	$18,000-$63,000
TMX 4/500	4	500	3.5	$10,000-$14,000

Company/Product Line	No. of Ports	Practical User Capacity	Storage Hours	Price
o Digitcom 405 S Beverly Dr. Suite 300 Beverly Hills, CA 90212 (213) 277-1220				
Resound	4-32	10,000	200	$7,500
o Dytel Corporation 50 East Commerce Drive Schaumburg, IL 60173 (312) 519-9850 Ext. 5400				
Dytel Message System	16	1,500	40	$9,000-$60,000
o Enhanced Systems 6961 Peachtree Industrial Blvd. Norcross, GA 30071 (404) 622-1503				
Hello!	4-64	N/A	N/A	$3,000 and up
o Fujitsu Business Communications Systems 2411 West 14th Street Tempe, AZ 85281 (800) 654-0715				
Voicemanager	2-4	30-100	up to 5	$9,000-$15,000
o Genesis 103 Woodmere Road Folsom, CA 95630 (916) 985-4050				
Voice Genie	2	512	5	$7,000-$12,000
CINDI II	2-8	512	21	$17,000-$44,000
CINDI III	4-24	4,000	80	$52,000-$129,000
o Hamilton Micro Electronics 16733 Ventura Blvd. #203 Encino, CA 91436 (818) 907-1572				
HVS 9010	2-102	10,000	3-202	$4,995 and up

Company/Product Line	No. of Ports	Practical User Capacity	Storage Hours	Price
o IBM/Rolm Systems 4900 Old Ironside Drive Santa Clara, CA 95054 (408) 986-1000				
ROLM Phone Mail	4-128	8,000	480	$35,000 and up
o Innovative Technology 1000 Holcomb Woods Pkwy. Suite 422 Rosewell, GA 30076 (404) 998-9970				
NITA Receptionist	4-16	unlimited	N/A	$12,000-$28,000
NITA PC	4-16	unlimited	5-40	$12,000-$30,000
o Macrotel 3540 NW 56 Street Fort Lauderdale, FL 33309 (800) 325-0019				
MACROVOICE ICP	12	unlimited	16	N/A
o Miami Voice 5215 NW 74th Avenue Miami, FL 33166 (305) 593-6077				
Voice Star	up to 6	300	up to 6	$9,000
Silver Palm	up to 24	10,000	up to 130	$16,000
o Microlog Corporation 20270 Goldenrod Lane Germantown, MD 20874 (800) 562-2822 (301) 428-3227				
VCS-3500	4-20	100	7-20	$16,000-$150,000

Company/Product Line	No. of Ports	Practical User Capacity	Storage Hours	Price
o MPSI 8848 Red Oak Blvd. Charlotte, NC 28217 (704) 527-8888				
A+ Plus	2-32	2,000	100	$18,000
o Natural Micro Systems 8 Erie Drive Natick, MA 01760 (800) 533-6120				
Watson	1	25	flexible	$199
VBX	12	flexible	flexible	$995 and up
o NEC America 8 Old Sod Farm Road Melville, NY 11747 (516) 753-7000				
NEAX2400 Voice Mail Module	8-32	4,000	8-128	N/A
o Northern Telecom 2305 Mission College Blvd. Santa Clara, CA 95054 (800) 328-8800				
Meridian Mail MP	4-48	30-500	9-300	$91,454 for 16 ports & 27 hrs.
Meridian Mail Option	4-12	30-700	up to 24	$21,000 for 4 ports & 5 hrs.
Meridian Mail SP	4-12	30-700	up to 24	$23,000 for 5 ports & 11 hrs.
o Octel Communications 890 Tasman Drive Milpitas, CA 95035 (408) 942-6500				
Aspen Branch/ Aspen Branch XP	up to 16	up to 275	up to 12.4	up to $72,000
Aspen/Aspen MAXUM	up to 72	up to 7,500	up to 304	up to $583,000
VPC 100	up to 8	100	up to 5	$13,500-$38,000

Company/Product Line	No. of Ports	Practical User Capacity	Storage Hours	Price
o OMNIVOICE 280 N Park Avenue Suite 108, Box 830 Warren, OH 44482 (216) 393-ECHO				
MINI ECHO	6	500	6	$12,500-$17,310
ECHO Model 1000	32	10,000	60	$29,500-$89,200
o Soft-Com 140 West 22nd Street New York, NY 10011 (212) 242-9595				
Diplomat	4-24	2,000	4-33	$14,000 and up
o Talking Technology 4383 Piedmont Avenue Oakland, CA 94611 (415) 652-9600				
BIGMOUTH	1	500	varies	$269
Powerline	2-16	2,000	flexible	$595-$895
o Tie/Communications 12 Commerce Drive Shelton, CT 06484 (203) 926-2000				
Tie Applications Processor	1-6	999	5-10	N/A
o Toshiba 9740 Irvine Blvd. Irvine, CA 92718 (800) 222-5805				
INTOUCH 4000/8000	2-8	application dependant	1-10	N/A

Company/Product Line	No. of Ports	Practical User Capacity	Storage Hours	Price
o VMX 110 Rose Orchard Way San Jose, CA 95135-1358 (800) 553-3425				
VMX 1000	43-164	117-1054	13-64	$35,000-$105,000
VMX 5000	12-64	708-5721	25-258	$122,000-$550,000
o VoiceCom 425 Franklin Road Suite 520 Marietta, GA 30067 (404) 428-0588				
Message Manager	64	varies	80	N/A
o Voice Exchange Technologies 12131 Dorsett Road Suite 129 St. Louis, MO 63043 (314) 298-1751				
VETEK	4-32	10,000	3-100	$16,200-$45,000
o Voice Mail International 2953 Bunker Hill Lane Santa Clara, Ca 95054 (408) 980-4000				
Voice Mail I	8-24	1,000-4,000	12.8-31.2	up to $119,000
Voice Mail II	8-64	1,000-[illegible],000	24.8-108.4	up to $290,000
Voice Mail III	8-128	1,000-[illegible],000	24.8-161.3	up to $495,000
o Voice Systems & Services Inc. (VSSI) One Technology Center Mannford, OK 74044 (918) 865-1000				
VSSI Communicator	4-512	50-70,000	10-600	$18,840
VSSI Communicator Jr.	4-12	50-800	5-30	$11,995
o Votan 4487 Technology Drive Fremont, CA 94538 (415) 490-7600				
Telecenter 4100		500	2-5	$7,995

Telecenter 4200	2-4	500	5-10	$17,685
Telecenter 4300	2-8	500	11-22	$29,540

GLOSSARY AND ABBREVIATIONS

Editors

Fred W. Huffman, Larry Podell, Arthur Rosenberg

Courtesy of AUDIOTEX DIRECTORY & BUYER'S GUIDE*

*The AUDIOTEX DIRECTORY AND BUYER'S GUIDE is a comprehensive sourcebook of equipment and service suppliers for the emerging voice processing/audiotex industry. Categories covered include voice messaging, voice response, call processing, pay-per-call network services (900, 976), speech synthesis and recognition, announcement systems, etc. Published semiannually, the AUDIOTEX DIRECTORY AND BUYER'S GUIDE is designed to make it easier for users to locate product and service suppliers in this fast-growing industry, such as hardware and software vendors, telephone companies, voice service bureaus, audio programmers, publications, consultants, etc.

For more information or to order the directory, contact ADBG Publishing, P.O. Box 25961, Los Angeles, CA 90025; FAX: 213-479-0654; Phone: 213-479-3533.

GLOSSARY

Note: No part of this Glossary or List of Abbreviations may be reproduced by any means except as permitted in writing by ADBG Publishing.

Address: A specific location identification, either a telephone number or a mailbox number, where a sender can leave or deposit a message.

Address (ID) Confirmation: The verification of numbers entered by a user or a caller on a pushbutton (DTMF) keypad. In messaging, the voice mailbox address number can be confirmed with pre-stored "Spoken Name" recordings of the (subscriber) addressee's name, which is more effective than simply playing back the digits of the mailbox address.

Advance Calling: A voice messaging function that enables a user to record a message and schedule delivery attempts to the recipient's telephone starting at a future date and time. (See Future Delivery)

Alphanumeric: Alphabetic and numeric characters.

Answering Machines: A recording device used to answer a telephone call, play an announcement and (optionally) record a message.

Applications Generator: A software tool that simplifies the development of telephone/voice processing application software. In particular, the system-level prompts, as well as the entire user dialog process can be scripted, including any data base interaction.

Architecture: The composition and functional components of a system described in a manner that easily conveys their inter relationships and functional purpose of the system.

ASCII Code: An abbreviation for American Standard Code for Information Interchange. An eight bit code established by the American National Standards Institute (ANSI).

Asynchronous: A method of transmitting data in which character placement on connecting transmitting lines is not critical.

Audiotex: A generic term used to describe various electronic communication products and services that enable users to send or receive information by interacting with a voice processing system via a telephone connection, using audio input (DTMF tones or speech). Audiotex encompasses the following types of services: information retrieval from a remote database, information collecting for polling and data entry, messaging capabilities

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permitting users to communicate with each other, conferencing services for simultaneous voice conversations, and financial transactions such as funds transfer or order entry for purchasing products.

Auto Dialer: A unit which can be pre-programmed to dial a multi-digit telephone number by activating a single pushbutton switch. Also known as a speed dialer.

Automated Attendant: A system facility designed to answer telephone calls and to direct callers to specific telephone extensions, voice mailboxes or informational mailboxes, without the assistance of a live operator.

Automatic Call Distributor (ACD): A special facility of a PBX or Central Office switch that automatically routes incoming calls to the next available agent or attendant in a line hunt group.

Automatic Number Identification (ANI): Equipment at a local central office that passes the calling party's telephone number to the called party's line.

Broadcast Message: A message composed and sent to all subscribers within a service group, a particular system location, or within a messaging network.

Bulletin Board (Voice): Enables messages to be "posted" in a public or restricted access mailbox, so that any callers can access them. The bulletin board differs from voice mail in that voice mail delivers messages to specific individuals or groups of individuals.

Call Diverter: Premises equipment used to transfer calls from one number to another pre-arranged number. Similar to "call forwarding".

Call Forwarding: A feature of a PBX or Central Office switch that allows a user to "forward" calls to another telephone.

Call Processing: The automated handling of incoming telephone calls, which can range from simple routine calls to an extension number, to full interaction with a caller in disseminating or collecting information or messages.

Call Routing: The process of directing calls through a telephone system or network to a particular phone number "address" (location).

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Capacity: Capacity in a voice processing system relates to several capabilities, including the total amount of voice storage, the maximum number of concurrent users (number of ports), and the maximum number of enrolled subscribers in the data base.

Central Office (CO): A main telephone office where switching equipment is housed and customer lines are terminated. Also contains trunk line connections to other central offices and inter-exchange carriers.

Central Processing Unit (CPU): The part of a computer's hardware that controls data transfer, input/output (I/O), and logical operations by executing instructions obtained from memory.

Class of Service: A set of parameters which defines the functions a subscriber may use.

Cluster (Networking): A method of connecting several voice processing systems together at a single location, usually via digital Local Area Network (LAN) connections, in order to increase the capacity of the system (number of ports, subscribers, etc.)

Commands: The signals a system responds to that are generated by a caller. Generally, these are DTMF signals, but commands can also be generated by speech detection.

Compression (Voice/Speech): A technique for reducing voice digitization rates while maintaining quality to a level satisfactory to support the application. For example, reducing voice digitization from 64,000 bits per second to 9,600 bit per second significantly reduces storage, (disk space) processing time, and transmission bandwidth requirements.

Concatenated Speech: A linked series of letters, numbers, words and/or phrases taken from a voice library, to form a complete voice response. This approach produces more human-sounding voice output, but is limited to relatively small and very structured voice output, e.g., voice prompts, error responses, numbers, etc.

Conference Call: Any call which includes the connection of three or more callers for a simultaneous discussion.

Configuration: The composition of hardware, software and communications facilities selected to implement a system to meet the particular capacity and functionality required by the using organization.

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Connect Time: The length of time a user or caller is accessing the system, i.e., from the time the system comes off-hook in responses to a ring signal, until the line is back on-hook at the end of the call.

Customer Premises Equipment (CPE): A phrase used by communications service providers to explicitly define communications equipment located on a customer's premises that is not owned by the service provider.

Customized Prompts: (See Prompt Generator)

Data Entry: The act of entering structured information into a computer system. Voice response technology enables data entry using the DTMF keypad or the microphone of a telephone.

Dial-It: A telephone company offering whereby callers pay each time they access an information program or conferencing service. A three digit code, e.g., 976, 900, 540, usually designates the type of service. A registered trademark of AT&T. (See Pay-per-call)

Digital Voice Announcer: A unit capable of recording voice information in digital memory, and playing the information to callers.

Digitized Speech: Speech that has been converted from an analog signal to a digital format so that it can be stored and processed by computer hardware and software.

Direct Inward Dialing (DID): A service offered by the telephone company in which a large group of telephone numbers are provided service via a small number of trunks to customer equipment. The central office can transmit the last three to seven digits of the dialed number.

Disk Drive: A random-access mass storage device used to store system and application programs, voice messages, prompts, subscriber data bases, and system activity data.

Distribution List: A list of addresses used to send a (voice) message to a group of people. Such addresses can be mailbox or telephone numbers. The distribution list is referenced by a shorthand code for addressing convenience.

Dual Tone Multi-Frequency (DTMF): Audible tones which conform to North American telephone standards. These are generated by pushbutton telephones to dial telephone numbers, as well as to provide control of data input to voice processing systems.

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Enhanced Service Provider: An entity providing its customers with "enhanced" communications services such as data storage and manipulation content generation or protocol conversion. An ESP is also considered by some to be a system owner or system operator. (See System Operator)

Future Delivery: A voice mail feature that allows a subscriber to schedule the deposit of a voice message into the recipient's voice mailbox at a specified date/time in the future. (See Advance Calling)

Facilities Management: An entity managing the computer and communications facility, that is dedicated to or owned by a particular using organization. The equipment may be located at the user's site or service location.

GAB: Group Access Bridging is a commercial service that allows various callers to join in on a conferenced phone call and participate in the ongoing conversations.

Gateway: A communication access by a physical hardware connection, a tariffed service offering, or a software interface that permits authorized access between networks and communication systems. In the context of voice information services, the "gateway" function also provides a directory facility for user access control.

Grade of Service (GOS): Used to define caller access service levels to a system, in terms of probability of getting a busy signal. a greater number of lines available for access results in a lower probability of a caller getting a busy signal.

"Guest" Mailboxes: Limited-use voice mailboxes that are assigned by a subscriber to non-subscribers for two-way message exchange between those parties and the Subscriber.

Host: A system that interfaces/integrates with a voice processing system for particular applications. Host systems can be telephone switches (PBXs, C.O. switches, etc.) or data base computers. When "integrated", information is passed between the two systems for controlling the call or transferring data.

Information Entry/Collection: A function which allows callers to input information in recorded voice form for subsequent transcription, or in data form using DTMF signals from the telephone pushbuttons.

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Information Provider (IP): A business that utilizes communications and computer facilities to deliver information to end users.

Interactive Audiotex: A capability that allows users to select options from a menu of programmed choices in order to control the course of the session (See also Passive Audiotex.)

Interexchange Carrier (IXC): A carrier that provides telephone service between designated service areas (LATA's).

"Listen-only" Voice Mailbox: A voice mailbox that allows a caller to listen to a pre-recorded announcement and then hangs up.

Local Access Transport Area (LATA): A geographical service area generally matching standard metropolitan and statistical areas (SMSA's). The local telephone company (local exchange carrier) provides service to each of the LATA's and access to long distance carriers (interexchange carriers). The interexchange carriers provide service (long distance) between each of the LATA's.

Mail Box: Electronic message storage assigned to a voice messaging subscriber and used as a delivery address.

Mail Box Number: A unique number assigned to a subscriber, often identical to a personal telephone number of extension and used to identify their messaging address.

Mailbox-specific Processing: A voice mail facility to enable individual mailboxes to handle calls in various ways, depending upon the call conditions and/or the callers' choices. This facility may use "mailbox branching" or a menu to transfer a caller to another mailbox.

Menu: A list of selection choices in an area of interest. In a computer system, a menu may be displayed on a computer screen. In a voice processing system, a menu is presented as a list of spoken choices.

Message: Recorded speech stored in a file (mailbox) used for call answering, voice mail, or audiotex applications.

Message Capacity: The number of messages that can be stored in a user's voice mail box. (See Storage Capacity)

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Message Center: A centralized operation consisting of live operators and/or an automated system that records and delivers messages from telephone callers.

Message Delivery Calls: The facility of a voice messaging system to call a phone number for delivering a voice message to a recipient. This may be to a voice mail subscriber getting delivery of new or urgent messages, or to a non-subscriber who is getting a voice message addressed with a telephone number. Delivery may be contingent on password entry.

Message Header/Envelope: Information appended to a voice message containing the address of the sender, the recipient, the date/time of origin, and priority.

Message-Waiting Indication/Notification: A method of notifying a user that their mail box contains a new message since last accessing their mail box. May be a light on a phone, stutter dial-tone when receiver is picked up, or an "active" phone call or radio page.

Messaging: Person-to-person communication that is non-simultaneous. Messaging may be "one-way", such as in telephone answering, where the caller can only leave a message, or "two-way" messaging, where the communications can both send and receive messages.

Modem: A acronym for "modulator/demodulator". Usually a single unit used to send ("modulate") and receive ("demodulate") information over bi-directional carriers or digital bit streams. digital information transfer between 2 systems over an analog circuit requires a modem at each end of the analog circuit.

Network: A series of remote devices or locations connected by communications transmission links on a permanent or dial-up basis. Voice mail networking is accomplished when separate systems are so interconnected and messages can be addressed to users on the other systems. Message transmission to remote sites can be done in analog or digital form. Audiotex applications are said to be networked when programs (voice files) are transferred from one system to another over a communications link. (See "Cluster".)

Network Access Charge: A monthly charge imposed on all single and multi-line business customers by the FCC mandate to compensate local exchange carriers (telephone companies) for the cost of connecting end-users and interexchange carriers.

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Non-Subscriber: A caller not known to a voice processing system through an identification number.

Notification of Non-Receipt: A feature of a voice messaging system to notify a sender that a message was not retrieved by a recipient.

Operator Assistance: Help provided to a caller by a live person, rather than from the system itself. In voice processing systems, an operator, also known as an "attendant" or "agent", can be reached by caller action or timeout when the caller has not touchtone telephone for control input, to take actions the system is not capable of handling, or when the caller needs help in navigating the transaction procedure.

Operator Revert: The ability for a caller to "escape" or be transferred from a voice processing system in order to access live assistance. (See Operator Assistance)

Order Entry: The initial step in a financial transaction process in which a user places an order for a product or service. The same procedure can be used for informational transactions.

Outdial/Outcall: Outgoing telephone call initiated by a voice processing system to deliver a message or a message notification to a designated phone number. This may be a spoken message delivered to a person or a call to initiate a radio page. Occasionally referred to as "call placement".

Paging: The process of alerting by radio or other signal. A voice mail system can trigger paging by making a telephone call to paging equipment to alert the user that a new message has been left in their mail box.

Partitioning: Where a single system's resources are dedicated to various applications or user groups. This will usually apply to ports (phone lines), memory, and voice storage on disks. The partitioning may be static or dynamic; the latter being more efficient for flexible usage requirements.

Passive Audiotex: A system where a caller cannot select any options. The outgoing message is pre-stored and not affected by the caller, but may be dynamically updated by the sponsor. (See also Interactive Audiotex)

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Password: A personal identification confirmation code employed by subscribers prevent unauthorized access to a voice service system. Also used to support billing and other administrative functions associated with the system. (See PIN and Subscriber)

Pause Removal/Compression: The elimination of unnecessary silences from recorded speech in order to minimize voice storage space. This reduction averages about 20% or normal speech in voice messages.

Pay-Per-Call: A type of service in which a charge is billed by the telephone carrier for each call placed by a user.

Personal Greeting: A recording by the owner/subscriber on an answering machine or voice mail box that a caller hears when the answering machine or mail box answers the phone.

Personal Identification Number (PIN): A unique code assigned to a subscriber for purposes of access to a system . (See Password and Subscriber)

Port: A telephone circuit connection on a system for user access.

Private Branch Exchange (PBX): Equipment used to switch telephone calls within a business site and between the site and outside lines.

Program (Call): Pre-recorded audio information available on either a passive or interactive basis for call processing.

Program Production: All activity necessary to produce an audiotex program, including script writing, talent selection, audio recording, voiceovers, programming menu structures, etc.

Program Vendor: A person or entity engaged in selling or marketing or audiotex programs.

Prompts: Audio information from a voice system that guides the user's interaction with the system.

Prompt Generator: A software utility that enables the creation and modification of application-oriented, system-level prompts, as opposed to individual voice mailbox scripts or announcements.

Public Utilities Commission (PUC): A government agency that approves tariffs to regulate the telephone companies within state or local boundaries.

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Pulse Dialing: An older form of telephone signaling associated with a rotary dial phone.

Random Access Memory (RAM): A method of data storage allowing access on a random basis as opposed, for example, to a fixed sequential basis.

Random Hunt: A hunting arrangement permitting an incoming call to terminate on any available line in a system.

Regional Bell Holding Company (RBHC): The corporate organizations consisting of the RBOCs and unregulated subsidiaries. Also known as BOCs.

Regional Bell Operating Company (RBOC): The regulated arm(s) of the Regional Bell Holding Companies consisting of the former Operating Telephone Companies which existed before the breakup of the Bell system. Also known as BOC.

Reseller: A purchaser and seller of goods and services, usually adding some value in the process. In the telecommunications industry a "reseller" is usually understood to be a reseller of long distance telephone service or enhanced service features.

RS232: An Electronic Industry Association (EIA) standard that defines a computer interface for connecting serial communications devices such as printers and modems.

Sequential Hunt: A hunting arrangement requiring incoming calls to terminate on the next trunk in a sequence, always starting at the first member number in a trunk group.

Service Bureau: A business providing access and usage for a fee to a computer system or network that provides access to and processing of information.

Service Charge: The charge for providing a service. Usually thought of as a recurring monthly charge.

Setup Charge: The charge made when establishing or starting a service, usually thought of as being a one time, non-recurring charge.

Space Broker: A business that provides the use of office space to house compute equipment; a location that is usually within the serving area of a central office that offers dial-it services.

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Speech (Voice) Recognition: The conversion of spoken works directly into text or data which can be processed by a computer system. (See Voice Commands).

Speech Synthesis: The computer generation of artificial speech output from text data, using various algorithms for pronunciation and voice tone to simulate the human voice. The technique is most appropriate for converting large amounts of unstructured prose, e.g., a document, names, etc., into verbal form. This differs from concatenated speech which uses actual recorded human speech "segments" to create spoken phrase combinations.

Storage Capacity: The amount of voice information that can be stored in a system, primarily on random-access disks measured in hours of time. Depending upon the compression rate employed, a given amount of disk storage will house a greater or smaller number of hours of spoken voice.

Subscriber: A person subscribing to and authorized to use a system or service offering by having a unique password.

System Operator: The entity that manages a system and is responsible for adding and deleting mailboxes, assigning addresses on the system, and controlling who is allowed on the system and what their level of participation will be. They may provide space, equipment and maintenance for an Information Provider. (Also see Enhanced Service Provider)

Talk-off: A condition that occurs when a voice processing system mistakenly interprets voice spectrum energy as a DTMF command.

Tariff: A schedule of rules and rates for charges by a utility sanctioned by the FCC or a state PUC.

Teleconferencing Systems: Systems used by callers to conduct simultaneous conversation by multiple parties.

Telemarketing Services: The performance of sales and marketing activity telephone. Inbound telemarketing involves receiving calls from prospective customers while outbound telemarketing involves outgoing telephone sales calls.

Telephone Answering Application: Use of a voice processing system to answer a telephone, play a previously stored personal greeting to a caller, and record a message from the caller.

Terminal: An input/output device for a computer. A pushbutton telephone is considered a terminal for a voice processing system.

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Text: Character strings entered on a keyboard that can be printed or displayed on a screen.

Text-to-Speech: Converting computer-stored text to voice information. (See Speech Synthesis)

Toll-Free Call: A call free of charge to the caller, but billable to the recipient.

Toolkit: A set of software utilities that facilitate the development of (voice processing) applications.

Tone Generator: A device acoustically coupled to a rotary phone, used to produce DTMF tones which can interact with a voice processing system.

Touch-Tone: A registered trademark of AT&T that names DTMF tones.

Traffic: The flow of calls and messages across a telecommunications network or to a call processing switch.

Transcription: Conversion of voice data into text data.

Tree Structure: Hierarchical arrangement of a database so that lower levels contain information of increasing detail. A menu exists at each level to provide a selection of options. Strictly speaking, it is an inverted tree.

Turnkey System: A communications system with all hardware, software and facilities components designed, assembled and installed by a single vendor, and sold as a package.

Uniform Call Distributor (UCD): An ACD programmed to distribute calls to agents or representatives on a basis other than simple next availability. (See ACD)

User Capacity: The number of users a system can realistically accommodate, dependent on voice storage, data base capacity, traffic capacity (number of lines), or processing power.

Value Added Reseller (VAR): One who acquires a product or service, adds application-oriented capabilities, and then resells the resulting product or service.

Voice Commands: A limited capability for computer recognition of spoken words for control input or data. Such recognition is often "speaker- dependent", where the system must be "trained" to recognize each individual user's voice.

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Voice Data: Recorded voice that is digitized and stored in a system for access by users.

Voice File: A segment of voice information recorded or stored in a way so as to be accessed and presented or used as a single program entity.

Voice Form/Script: A structured series of voice prompts played to a caller for entering information in sequenced order. This information may be DTMF data (digits) or recorded speech.

Voice Information Services: Services designed and intended to be used to provide information via a voice presentation rather than on paper of other media.

Voice Library: A set of letters, numbers, words and phrases stored in voice form that can be used by the system software to make a meaningful presentation of prompts of program material.

Voice Mail: Voice messages that are created by accessing a voice messaging system for delivery to one or more subscribers.

Voice Message: A message addressed to or deposited into a subscriber's voice mailbox from another subscriber or a nonsubscribing caller. The message will be recorded, stored and delivered in voice form. Voice messages may also be announcements accessible by an caller.

Voice-Over Production: The production of voice information; generally spoken voice with music or sound effects in the background.

Voice Processing: The use of digital/computer technology (hardware & software) to process (store, retrieve, manipulate) voice or any kind of information similar in spectrum and energy content to human voice.

Voice Response Systems: Systems capable of providing passive or interactive automated voice communications sessions with callers.

Wide Area Telephone Service (WATS): A telephone company billing plan to provide high volume, long distance, outbound service at a lower cost.

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List of Abbreviations

ACK	Acknowledgement
A/D	Analog/Digital
A/N	Alpha/Numeric
ADPCM	Adaptive Delta Pulse Code Modulation
AI	Artificial Intelligence
AIR	Authorized Industry Reseller
AL	Access Link
AMIS	Audio Message Interchange Standard
ANI	Automatic Number Identification
ANSI	American National Standards Institute
AP	Application Processor
ASC	Accredited Standards Committee
ATTN	Attention
ASYNC	Asynchronous
ATX	Audiotex
BCLID	Bulk Caller Line Identification
BOC	Bell Operating Company
BSA	Basic Service Arrangement
BSC	Business Service Center
BRI	Basic Rate Interface
BSE	Basic Service Element
CCITT	Consultative Committee for International Telephone and Telegraph
CCS	Common Channel Signalling
CCIS	Common Channel Inter-office Signalling
CEI	Comparably Efficient Interconnection
CF/B	Call Forward on Busy
CF/DA	Call Forward on Don't Answer
CI-III	Computer Inquiry III
CLASS	Custom Local Area Signalling System
CNI	Calling Number Identification
CNS	Complementary Network Services
CO	Central Office
COS	Class of Service (Voice System Users)
COG	Centralized Operations Group
CPE	Customer Premises Equipment
CPNI	Customer Prorietary Network Information
CPU	Central Processor(ing) Unit
CR	Carriage Return
CRIS	Customer record and Information System
CSB	Customer Service Bureau
CTX	Centrex
CVSDM	Continuously Variable Slope Delta Modulation
D/A	Digital/Analog
db	Decibel
DCIU	Data Communications Interface Unit
DCP	Digital Communications Protocol
DFS	Distributed File System
DID	Direct Inward Dial
DISA	Data Interchange Standards Association, Inc.
DNIC	Data Network Identification Code
DP	Dial Pulse
DTE	Data Terminal Equipment
DTMF	Dual Tone Multiple Frequency
EARAM	Electrically Alterable Random Access Memory
ECSA	Exchange Carrier Standards Association
EDI	Electronic Data Interchange
ENQ	Enquiry
EPROM	Electrically Programmable Read Only Message
EOM	End of Message
EOS	End of Session
EPSCS	Enhanced Private Switched Communications Service
ESP	Enhanced Service Provider
ESS	Electronic Switching System
ETN	Electronic Tandem Network
FD	Full Duplex
FEP	Front End Processor
FSD	Fixed Storage Device
GAB	Group Access Bridging

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Abbreviations (cont'd)

GBS	Group Bridging Services
GOS	Grade of Service
HD	Half Duplex
HD	Hard Disk
IEC	International Electro-Technical Commission
IEC	Intrexchange Carrier
IEEE	Institute of Electrical and Electronic Engineers
ICLID	Individual Caller Line Identification
ICSC	Inter-exchange Carrier Service Center
IDF	Intermediate Distribution Frame
IILC	Information Industry Liaison Committee
IN2	Intelligent Network 2
I/O	Input/Output (Computer)
IP	Information Provider
ISDN	Integrated Services Digital Network
ISO	International Standards Organization
ISP	Information/Service Provider
IVDT	Integrated Voice & Data Terminal
IVR	Interactive Voice Response
IXC	Interexchange Carrier
KB	Kilo-bit(byte)
LATA	Local Access and Transport Area
LEC	Local Exchange Carrier
LSSGR	LATA Switching System General Requirement
MB	Mega-bit(byte)
MDF	Main Distribution Frame
MF	Multi-Frequency
MWI	Message Waiting Indication
NBS	National Bureau of Standards
NCK	Not Acknowledged
NCP	Network Control Point
NCTE	Network Channel Terminating Equipment
NFS	Network File Server
NISO	National Information Standard Organization
NNX	Network Number XXXX
NPA	Numbering Plan Area
NURE	Network Utilization Rate Element
OEM	Original Equipment Manufacturer
ONA	Open Network Architecture
OS	Operating System
OSA	Open Systems Architecture
OSI	Open Systems Interconnection
PAD	Packet Assembler/Dissassemble
PBX	Private Branch Exchange
PCM	Pulse Code Modulation
PDN	Public Data Network
PID	PBX Integration Device
PIP	Prospective (or Potential) Information Provider
POTS	Plain Old Telephone Service
PRI	Primary Rate interface
PROM	Programmable Read Only Memory
RBHC	Regional Bell Holding Company
RBOC	Regional Bell Operating Company
RAM	Random Access Memory
RCF	Remote Call Forwarding
REQ	Request
RISC	Reduced Instruction Set Computer
ROM	Read Only Memory
RFI	Request for Information
RFQ	Request for Quotation
RFS	Remote File Sharing
RSD	Removable Storage Device
RSM	Remote Switching Module
SARTS	Switched Acces Remote Test System
SMDI	Simplified Message Desk Interface
SMSI	Simplified Message System Interface
SOM	Start Of Message
SS7	Signalling System Seven
STP	Signal Transfer Point
TA	Technical Advisory

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Abbreviations (cont'd)

TAG	Technical Analysis Group
TDM	Time Division Multiplexor
TIC	Telephone Interface Card
TR	Technical Reference
TRK	Trunk
T/U	Transport/Usage
USOC	Universal Service Order Code
VAN	Value Added Network
VAR	Value Added Reseller
VIS	Voice Information Services
VM	Voice Mail
VMS	Voice Messaging/Mail System
VR	Voice Response
VRU	Voice Response Unit
VTX	Videotex
VU	Volume Unit
WATS	Wide Area Telephone Service

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